

## CLAIMS

What is claimed is:

5 1. An auto-cruise apparatus comprising a vehicle-to-vehicle distance controller for controlling a vehicle speed of a subject vehicle with a set vehicle speed as an upper limit of said vehicle speed such that a vehicle-to-vehicle distance between said subject vehicle and a preceding vehicle becomes equal to a set vehicle-to-vehicle distance and controlling said  
10 vehicle speed such that said vehicle speed becomes equal to said set vehicle speed when it is determined that there exists no preceding vehicle and input means capable of being operated by a driver with regard to a vehicle-to-vehicle distance control performed by said vehicle-to-vehicle distance controller wherein said set vehicle-to-vehicle distance and said set vehicle  
15 speed can be set by said driver via said input means, said auto-cruise apparatus further comprising:

a constant vehicle speed controller for controlling said vehicle speed such that said vehicle speed is maintained at said set vehicle speed whether a preceding vehicle may exist or not; and

20 a mode selector for selecting, in accordance with predetermined operations upon said input means, either a vehicle-to-vehicle distance control mode in which a travel of said subject vehicle is controlled by said vehicle-to-vehicle distance controller or a constant vehicle speed control mode in which said travel is controlled by said constant vehicle speed  
25 controller,

wherein a travel control by either said vehicle-to-vehicle distance controller or said constant vehicle speed controller is performed in accordance with a travel mode that has been selected by said mode selector.

2. An auto-cruise apparatus as claimed in claim 1, wherein said mode selector selects said vehicle-to-vehicle distance control mode when said predetermined operations upon said input means comprise such operations  
5 that have a operating time less than a predetermined time period and selects said constant vehicle speed control mode when said predetermined operations upon said input means comprise such operations that have an operating time equal to or more than a predetermined time period.

10 3. An auto-cruise apparatus as claimed in claim 1 or 2,

wherein said input means further comprises a cruise switch for switching between a control state in which a vehicle-to-vehicle distance control by said vehicle-to-vehicle distance controller or a constant vehicle speed control by said constant vehicle speed controller is performed and a  
15 non-control state in which both said vehicle-to-vehicle distance control and said constant vehicle speed control are disabled; and

wherein said mode selector selects either said vehicle-to-vehicle distance control mode or said constant vehicle speed control mode in accordance with predetermined operations upon said cruise switch.

20 4. An auto-cruise apparatus as claimed in claim 3, wherein said mode selector selects either said vehicle-to-vehicle distance control mode or said constant vehicle speed control mode in accordance with said predetermined operations upon said cruise switch if said predetermined operations upon  
25 said cruise switch are performed when the subject vehicle is in said non-control state.

5. An auto-cruise apparatus as claimed in claim 1 or 2, wherein said mode

selector performs a switching from said vehicle-to-vehicle distance control mode to said constant vehicle speed control mode in response to predetermined operations upon said input means if the subject vehicle is in said vehicle-to-vehicle distance control mode and performs a switching from  
5 said constant vehicle speed control mode to said vehicle-to-vehicle distance control mode in response to predetermined operations upon said input means if the subject vehicle is in said constant vehicle speed control mode.

10 6. An auto-cruise apparatus as claimed in claim 5, wherein said mode selector performs a switching to said non-control state if predetermined operations upon said input means are performed when the subject vehicle is in either said vehicle-to-vehicle distance control mode or said constant vehicle speed control mode.

15 7. An auto-cruise apparatus as claimed in claim 1,  
wherein said input means further comprises vehicle-to-vehicle distance setting means for setting said set vehicle-to-vehicle distance; and

20 wherein said mode selector performs a switching from said constant vehicle speed control mode to said vehicle-to-vehicle distance control mode in response to such operation upon said vehicle-to-vehicle distance setting means that decreases said vehicle-to-vehicle distance when the subject vehicle is in said constant vehicle speed control mode.

25 8. An auto-cruise apparatus as claimed in claim 1,  
wherein said input means further comprises vehicle-to-vehicle distance setting means for setting said set vehicle-to-vehicle distance; and

wherein said mode selector performs a switching from said vehicle-to-vehicle distance control mode to said constant vehicle speed control mode in

response to such operation upon said vehicle-to-vehicle distance setting means that increases said vehicle-to-vehicle distance and is performed for a predetermined time period or more when the subject vehicle is in said vehicle-to-vehicle distance control mode.

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9. An auto-cruise apparatus as claimed in claim 8,

wherein said vehicle-to-vehicle distance setting means is capable of setting said vehicle-to-vehicle distance to at least a long, middle or short distance; and

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wherein said mode selector performs a switching from said vehicle-to-vehicle distance control mode to said constant vehicle speed control mode in response to such operation upon said vehicle-to-vehicle distance setting means that increases said vehicle-to-vehicle distance and is performed for a predetermined time period or more when said vehicle-to-vehicle distance is set to long.

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10. An auto-cruise apparatus as claimed in any one of claims 7 through 9,

wherein said input means further comprises a cruise switch for switching between a control state in which a vehicle-to-vehicle distance control by said vehicle-to-vehicle distance controller or a constant vehicle speed control by said constant vehicle speed controller is performed and a non-control state in which both said vehicle-to-vehicle distance control and said constant vehicle speed control are disabled; and

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wherein said set vehicle-to-vehicle distance is set to middle when said non-control state is switched to said vehicle-to-vehicle distance control mode.

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11. An auto-cruise apparatus as claimed in any one of claims 1 to 10,

wherein said set vehicle speed is set to a current vehicle speed when said vehicle-to-vehicle distance control mode is switched to said constant vehicle speed mode.

- 5 12. An auto-cruise apparatus as claimed in any one of claims 1 through 10, further comprising preceding vehicle determination means for determining a preceding vehicle that said subject vehicle should follow,

wherein a switching from said vehicle-to-vehicle distance control mode to said constant vehicle speed mode by said mode selector is allowed only when said preceding vehicle determination means determines that there exists no preceding vehicle.

13. An auto-cruise apparatus as claimed in any one of claims 1 through 10, wherein said set vehicle speed that has been already set is reset when a switching from said vehicle-to-vehicle distance control mode to said constant vehicle speed mode is performed.

14. A method for switching a mode of an auto-cruise apparatus, said auto-cruise apparatus comprising a vehicle-to-vehicle distance controller for controlling a vehicle speed of a subject vehicle with a set vehicle speed as an upper limit of said vehicle speed such that a vehicle-to-vehicle distance between said subject vehicle and a preceding vehicle becomes equal to a set vehicle-to-vehicle distance and controlling said vehicle speed such that said vehicle speed becomes equal to said set vehicle speed when it is determined that there exists no preceding vehicle and input means capable of being operated by a driver with regard to a vehicle-to-vehicle distance control performed by said vehicle-to-vehicle distance controller wherein said set vehicle-to-vehicle distance and said set vehicle speed can be set by said

driver via said input means, said auto-cruise apparatus further comprising:

a constant vehicle speed controller for controlling said vehicle speed such that said vehicle speed is maintained at said set vehicle speed whether said preceding vehicle may exist or not; and

5 a mode selector for selecting, in accordance with predetermined operations upon said input means, either a vehicle-to-vehicle distance control mode in which a travel of said subject vehicle is controlled by said vehicle-to-vehicle distance controller or a constant vehicle speed control mode in which said travel is controlled by said constant vehicle speed controller,

10 wherein said input means further comprises vehicle-to-vehicle distance setting means for setting said set vehicle-to-vehicle distance; and

said method comprising the steps of:

15 performing said constant vehicle speed control mode by said constant vehicle speed controller; and

performing a switching from said constant vehicle speed control mode to said vehicle-to-vehicle distance control mode by said mode selector in response to such operation upon said vehicle-to-vehicle distance setting means that decreases said vehicle-to-vehicle distance.

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15. A method for switching a mode of an auto-cruise apparatus, said auto-cruise apparatus comprising a vehicle-to-vehicle distance controller for controlling a vehicle speed of a subject vehicle with a set vehicle speed as an upper limit of said vehicle speed such that a vehicle-to-vehicle distance  
25 between said subject vehicle and a preceding vehicle becomes equal to a set vehicle-to-vehicle distance and controlling said vehicle speed such that said vehicle speed becomes equal to said set vehicle speed when it is determined that there exists no preceding vehicle and input means capable of being

operated by a driver with regard to a vehicle-to-vehicle distance control performed by said vehicle-to-vehicle distance controller wherein said set vehicle-to-vehicle distance and said set vehicle speed can be set by said driver via said input means, said auto-cruise apparatus further comprising:

5 a constant vehicle speed controller for controlling said vehicle speed such that said vehicle speed is maintained at said set vehicle speed whether said preceding vehicle may exist or not; and

a mode selector for selecting, in accordance with predetermined operations upon said input means, either a vehicle-to-vehicle distance control mode in which a travel of said subject vehicle is controlled by said vehicle-to-vehicle distance controller or a constant vehicle speed control mode in which said travel is controlled by said constant vehicle speed controller,

10 wherein said input means further comprises vehicle-to-vehicle distance setting means for setting said set vehicle-to-vehicle distance; and

15 said method comprising the steps of:

performing said vehicle-to-vehicle distance control mode by said vehicle-to-vehicle distance controller; and

performing a switching from said vehicle-to-vehicle distance control mode to said constant vehicle speed control mode by said mode selector in response to such operation upon said vehicle-to-vehicle distance setting means that increases said vehicle-to-vehicle distance and is performed for a predetermined time period or more.

20 16. A method for switching a mode of an auto-cruise apparatus as claimed in claim 15,

wherein said vehicle-to-vehicle distance setting means is capable of setting said vehicle-to-vehicle distance to at least a long, middle or short

distance; and

wherein said mode selector performs a switching from said vehicle-to-vehicle distance control mode to said constant vehicle speed control mode in response to such operation upon said vehicle-to-vehicle distance setting means that increases said vehicle-to-vehicle distance and is performed for a predetermined time period or more when said vehicle-to-vehicle distance is set to long.

17. A method for switching a mode of an auto-cruise apparatus as claimed in any claim from 14 through 16,

wherein said input means further comprises a cruise switch for switching between a control state in which a vehicle-to-vehicle distance control by said vehicle-to-vehicle distance controller or a constant vehicle speed control by said constant vehicle speed controller is performed and a non-control state in which both said vehicle-to-vehicle distance control and said constant vehicle speed control are disabled; and

wherein said set vehicle-to-vehicle distance is set to middle when said non-control state is switched to said vehicle-to-vehicle distance control mode.

18. A method for switching a mode of an auto-cruise apparatus, said auto-cruise apparatus comprising a vehicle-to-vehicle distance controller for controlling a vehicle speed of a subject vehicle with a set vehicle speed as an upper limit of said vehicle speed such that a vehicle-to-vehicle distance between said subject vehicle and a preceding vehicle becomes equal to a set vehicle-to-vehicle distance and controlling said vehicle speed such that said vehicle speed becomes equal to said set vehicle speed when it is determined that there exists no preceding vehicle and input means capable of being



operated by a driver with regard to a vehicle-to-vehicle distance control performed by said vehicle-to-vehicle distance controller wherein said set vehicle-to-vehicle distance and said set vehicle speed can be set by said driver via said input means, said auto-cruise apparatus further comprising:

5 a constant vehicle speed controller for controlling said vehicle speed such that said vehicle speed is maintained at said set vehicle speed whether said preceding vehicle may exist or not; and

a mode selector for selecting, in accordance with predetermined operations upon said input means, either a vehicle-to-vehicle distance control mode in which a travel of said subject vehicle is controlled by said vehicle-to-vehicle distance controller or a constant vehicle speed control mode in which said travel is controlled by said constant vehicle speed controller,

wherein said method comprising the steps of:

15 performing said vehicle-to-vehicle distance control mode by said vehicle-to-vehicle distance controller; and

performing a switching from said vehicle-to-vehicle distance control mode to said constant vehicle speed control mode by said mode selector,

20 wherein said set vehicle speed is set to a current vehicle speed when said vehicle-to-vehicle distance control mode is switched to said constant vehicle speed mode.

19. A method for switching a mode of an auto-cruise apparatus, said auto-cruise apparatus comprising a vehicle-to-vehicle distance controller for controlling a vehicle speed of a subject vehicle with a set vehicle speed as an upper limit of said vehicle speed such that a vehicle-to-vehicle distance between said subject vehicle and a preceding vehicle becomes equal to a set vehicle-to-vehicle distance and controlling said vehicle speed such that said

vehicle speed becomes equal to said set vehicle speed when it is determined that there exists no preceding vehicle and input means capable of being operated by a driver with regard to a vehicle-to-vehicle distance control performed by said vehicle-to-vehicle distance controller wherein said set  
5 vehicle-to-vehicle distance and said set vehicle speed can be set by said driver via said input means, said auto-cruise apparatus further comprising:

a constant vehicle speed controller for controlling said vehicle speed such that said vehicle speed is maintained at said set vehicle speed whether said preceding vehicle may exist or not; and

10 a mode selector for selecting, in accordance with predetermined operations upon said input means, either a vehicle-to-vehicle distance control mode in which a travel of said subject vehicle is controlled by said vehicle-to-vehicle distance controller or a constant vehicle speed control mode in which said travel is controlled by said constant vehicle speed  
15 controller,

wherein said apparatus further comprises preceding vehicle determination means for determining a preceding vehicle that said subject vehicle should follow, and

said method comprising the steps of:

20 performing said vehicle-to-vehicle distance control mode by said vehicle-to-vehicle distance controller; and

allowing a switching from said vehicle-to-vehicle distance control mode to said constant vehicle speed mode by said mode selector only when said preceding vehicle determination means determines that there exists no  
25 preceding vehicle.

20. A method for switching a mode of an auto-cruise apparatus, said auto-cruise apparatus comprising a vehicle-to-vehicle distance controller for

controlling a vehicle speed of a subject vehicle with a set vehicle speed as an upper limit of said vehicle speed such that a vehicle-to-vehicle distance between said subject vehicle and a preceding vehicle becomes equal to a set vehicle-to-vehicle distance and controlling said vehicle speed such that said vehicle speed becomes equal to said set vehicle speed when it is determined that there exists no preceding vehicle and input means capable of being operated by a driver with regard to a vehicle-to-vehicle distance control performed by said vehicle-to-vehicle distance controller wherein said set vehicle-to-vehicle distance and said set vehicle speed can be set by said driver via said input means, said auto-cruise apparatus further comprising:

a constant vehicle speed controller for controlling said vehicle speed such that said vehicle speed is maintained at said set vehicle speed whether said preceding vehicle may exist or not; and

a mode selector for selecting, in accordance with predetermined operations upon said input means, either a vehicle-to-vehicle distance control mode in which a travel of said subject vehicle is controlled by said vehicle-to-vehicle distance controller or a constant vehicle speed control mode in which said travel is controlled by said constant vehicle speed controller,

wherein said input means further comprises vehicle-to-vehicle distance setting means for setting said set vehicle-to-vehicle distance; and

said method comprising the steps of:

performing said vehicle-to-vehicle distance control mode by said vehicle-to-vehicle distance controller; and

performing a switching from said vehicle-to-vehicle distance control mode to said constant vehicle speed control mode by said mode selector,

wherein said set vehicle speed that has been already set is reset when a switching from said vehicle-to-vehicle distance control mode to said

